

AJO PEAK TO TINAJAS ALTAS: A FLORA OF SOUTHWESTERN ARIZONA PART 4. ANGIOSPERMS: MAGNOLIIDS

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ABSTRACT

A floristic account is provided for the Aristolochiaceae and Saururaceae (Magnoliids) as part of the vascular plant flora of the contiguous protected areas of Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge, and the Tinajas Altas Region in southwestern Arizona—the heart of the Sonoran Desert. This floristic treatment includes brief descriptions, common names when available in English, Spanish, and the local O’odham language, local and global distributions, ethnobotanical information, and specimen citations. This is the fourth contribution for our flora. These contributions are also posted open access on the website of the University of Arizona Herbarium (ARIZ).

This publication is a floristic account of the Aristolochiaceae and Saururaceae (Magnoliids) as part of the vascular plant flora of the contiguous protected areas of Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge, and the Tinajas Altas Region in southwestern Arizona (Figure 1). This is the fourth contribution to our flora in southwestern Arizona, following the introduction of the flora (Felger et al. 2013a), a checklist of the modern and fossil flora (Felger et al. 2013b), and the fern, lycopods, and gymnosperms (Felger et al. 2013c). Explanation of the format for the flora is provided in part 3 (Felger et al. 2013c). These contributions are also posted open-access on the website of the University of Arizona Herbarium (ARIZ).

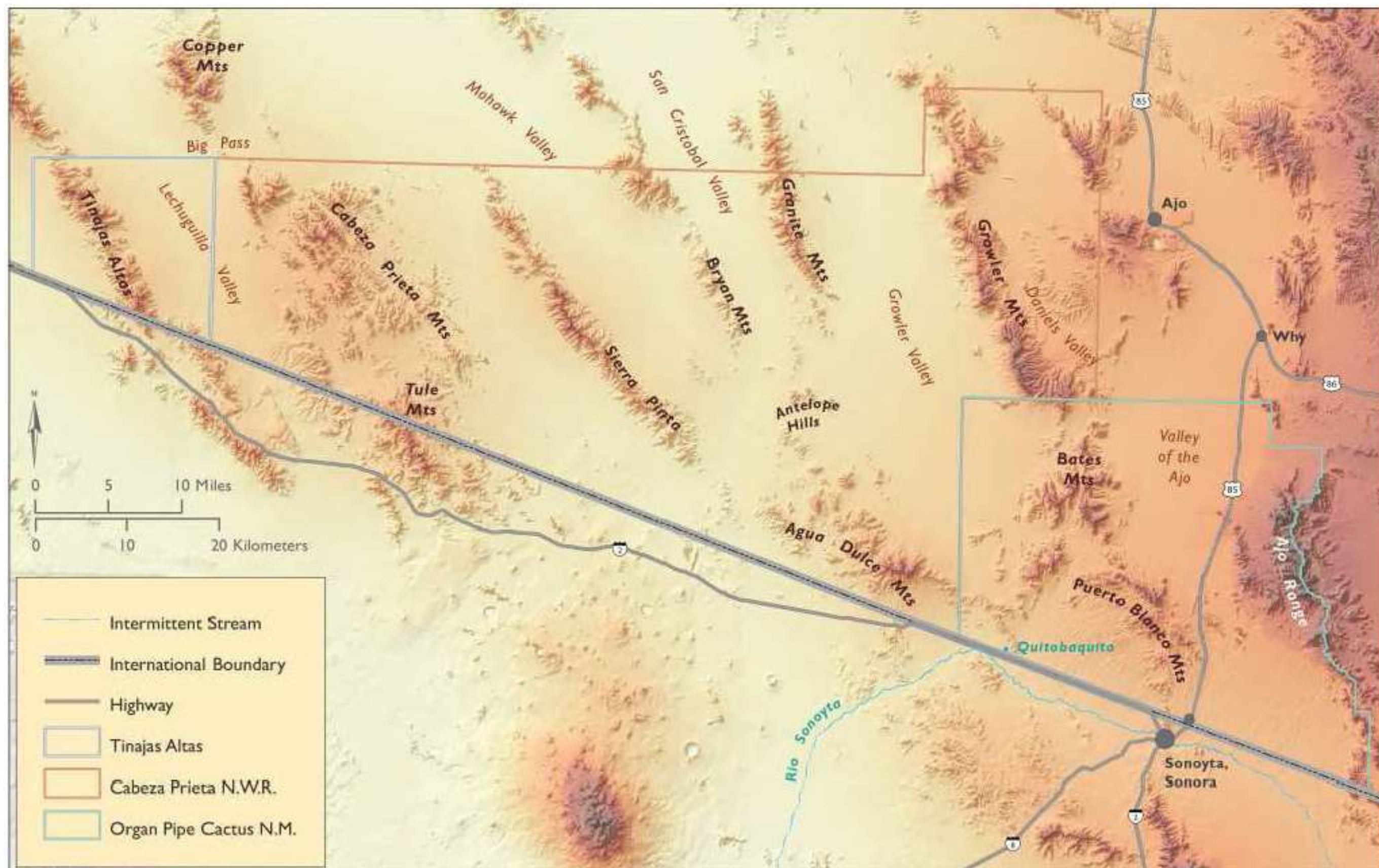


Figure 1. Map of the flora area in southwestern Arizona. Map prepared by Ami Pate of Organ Pipe Cactus NM.

1. Terrestrial, dryland plants; stems slender, trailing to vining, without stolons; leaves mostly less than 10 cm long; leaf blades hastate **Aristolochiaceae**
1. Plants emergent from shallow water or on damp soil; stems short, thick and woody and also forming long stolons; leaves mostly more than 10 cm long; leaf blades elliptic-ovate **Saururaceae**

ARISTOLOCHIACEAE – Birthwort Family

This family includes 5 genera and 600 species worldwide, mostly in tropical regions, a few in temperate regions, and very few in deserts. *Aristolochia* also is mostly tropical, with 300 species worldwide, some of which are important medicinal herbs although they also contain toxins.

Aristolochia watsonii Wooton & Standley

[*A. brevipes* Benth. var. *acuminata* S. Watson, not *A. acuminata* Lamour.; *A. porphyrophylla* H. Pfeifer]

Indian-root; *hierba del indio*, *zapatito*. Figures 2, 3.

Herbaceous perennials from an orange carrot-shaped thickened woody root. Stems slender, herbaceous, trailing, often less than 30 cm long or sometimes vining to about 1 m in shaded, moist habitats; dying back to the root during drought and freezing weather. Leaves alternate, the larger ones 3–10 (12) cm long, often brownish or purplish; blades arrow-shaped (hastate), the lobes (“ears”) as long as or longer than the petiole. Flowers solitary in leaf axils, 3.5–5 cm long; calyx bilateral, with a moderately inflated tube surrounding the style and stamens (just above the ovary) and narrowed at the throat; calyx limb somewhat tooth-shaped, yellow-green with brown-purple spots mostly along veins, the margin and tip dark maroon, and with downward pointing hairs inside the tube; without a corolla. Fruits many-seeded capsules, ovoid, 1.6–2.5 cm long, prominently ridged along the midrib of each of



Figure 2. *Aristolochia watsonii*. Hwy 85 near Organ Pipe CNM visitor center, 28 Aug 2008. Photo by Sue Rutman.



Figure 3. *Aristolochia watsonii*. Near Cliff, New Mexico, 19 Apr 2010. Photo by Russell Kleinman (gilaflorea.com).

5 valves. Seeds flattened and blackish. Growing and flowering during warm to hot weather with sufficient soil moisture.

Lowlands of Organ Pipe Cactus National Monument and on the east side of Cabeza Prieta National Wildlife Refuge Cabeza Prieta. Generally localized, mostly along washes and floodplains or swales in valley floors, canyon bottoms and lower slopes, and in a charco (artificial water catchment) in Cabeza Prieta. Sometimes growing from rock crevices.

Arizona and New Mexico to Nayarit, and southern Baja California and Baja California Sur. This is one of the smallest of the aristolochias worldwide.

An intriguing article by Crosswhite and Crosswhite (1984) reported that flowers are pollinated by small ceratopogonid flies that feed on blood of unwilling mammals (including humans). They also noted that the flower resembles a mouse ear, and the color, pattern, and odor are characteristic of fly-pollinated flowers. However, we do not know of specific pollination studies for *A. watsonii*. The fly trap of the *Aristolochia* flower shows some similarities with the trapping mechanism of the insectivorous pitcher plant (*Sarracenia*). However, a fly drawn to a pitcher plant never escapes – it's digested. In contrast, studies of *Aristolochia* with flowers similar to those of *A. watsonii* reveal that it is aiming not for a meal, but pollination. The general scenario for small pipevine flowers is that the flower tricks and traps the flies in the floral tube with its downward-pointing hairs facilitating entry but discouraging exit. When the anthers open, the trapping trichomes wilt from a loss of turgor pressure, and the fly is released with attached pollen, free to find another pipevine flower (Oelschlägel et al. 2009).

Caterpillars of the pipevine swallowtail butterfly (*Battus philenor*, Fig. 4) feed on *Aristolochia*, including *A. watsonii*. These caterpillars sequester aristolochic acid from the plants, which renders the larvae as well as the butterflies toxic to birds.



Figure 4. *Battus philenor* caterpillar. Near Yocogigua, Sonora, Mexico, 14 September 2012. Photo by Tom Van Devender.

Felger and Moser (1985: 230) recorded Seri medicinal use of *Aristolochia watsonii*: “A decoction of the herbage cooked in water was held in the mouth to cure a toothache. The dry root

was heated in a fire and placed over a cavity in a tooth.” Hia C'ed O'odham also used the roots medicinally (Felger et al. 1992). It should be noted that aristolochias contain powerful toxins or poisons that can be fatal, although they have been used medicinally worldwide since ancient times, one of the early descriptions being by Dioscorides in the first century CE.

OP: Cipriano Well, *Nichol* 27 Apr 1939. Alamo Canyon, 13 Dec 1939, *Harbison* 26273 (SD). Dos Lomitas, 1400 ft, *Warren* 17 Nov 1974. Dos Lomitas, 1400 ft, *Warren* 17 Nov 1974. Aguajita, wash, 13 Sep 1986, *Felger* 86-275. Kuakatch Wash west of Armenta Ranch, *Rutman* 4 Oct 1995 (ORPI).

CP: Road from Bates Well at 1.7 mi SW of W boundary of Organ Pipe, 14 Sep 1992, *Felger* 92-700. Jose Juan Tank, 14 Sep 1992, *Felger* 92-709. Daniels Arroyo, 27 Sep 1992, *Harlan* 343. Road to Lower Well, 25 Feb 1993, *Felger* 93-70 (CAB).

SAURURACEAE – Lizard-tail Family

The Saururaceae includes 4 genera and 6 species of herbaceous perennials native to Asia and North America. These plants are characterized in part by tannin and ethereal oil cells in the parenchyma tissue, which may account for the long and varied medicinal uses. *Anemopsis* is monotypic.



Figure 5. *Anemopsis californica*, at Quitobaquito, growing with *Distichlis spicata*, 5 May 2008. Photo by Sue Rutman.

Anemopsis californica (Nuttall) Hooker & Arnott
Yerba mansa; *hierba mansa*; va:vis. Figures 5, 6.

Herbaceous perennial herbs, with thick, creeping and aromatic rootstocks and long, above-ground stolons. Winter dormant, the above-ground parts killed by freezing weather; the dried or reduced leaves persist through the winter. Leaves and stolons often reddish or red-tinged. Leaves

alternate, mostly basal, simple; stipules fused to the petiole; petioles 3–80 cm long, the blades elliptic-ovate, 5–15 (30) × 3–7.5 (14) cm (much smaller when drought stressed), the margins entire. Inflorescence a spike simulating a single flower (*Anemopsis* is Greek for ‘anemone-like’), 1–several on stems 12–110 cm tall with 1 or few reduced leaves. Spikes many-flowered, compact, thick and conical, mostly 3–3.8 cm long, subtended by white petal-like bracts (2) 2.5–4 cm long; flowers fragrant; perianth none. Ovaries sunken in rachis of spike. Mass flowering especially in late spring and summer.

Abundant in alkaline soils at Quitobaquito where perennial water is at or within about 15 cm of the surface. Also common in wetlands in nearby Sonoyta, Sonora, and the Río Colorado delta region (Felger 2000).

Semi-saline and alkaline soils of wetlands in southwestern USA and northwestern Mexico.



Figure 6. *Anemopsis californica*, at Quitobaquito; photos by Sue Rutman. **A.** Leaf and flowering stem with a reduced leaf and inflorescence, 3 May 2008. **B.** Inflorescences, 5 May 2008.

Yerba mansa is one of the most esteemed medicinal plants in western North America (e.g., Moreman 1998) including southwestern Arizona and western Sonora (e.g., Felger 2000, 2007; Felger & Moser 1985; Felger et al. 1992; Hrdlicka 1908; Lumholtz 1912; Rea 1997; Betty Melvin in Zepeda 1985: 42). It has long been cultivated in the region and is grown in cool, shaded gardens in Sonoyta as well as kitchen gardens and at farms elsewhere in the region. It is often one of the first plants that traditional Sonoran Desert people planted in their gardens and it can be assumed that people have long been transplanting it. The term *mansa* may be translated as tame, meek, gentle, mild, quiet, soft, gentle, or lamblike. The plants also have been used as a source of tannin.

Local people used yerba mansa as a remedy for cough, cold, flu, and impetigo (Felger et al. 1992; Zepeda 1985). It “makes you hot inside and that’s what takes care of the sickness” (Delores Lewis in Felger et al. 1992: 32). Betty Melvin “remembers when her grandmother used to carry it all the time with her where they would boil it and drink the water that the plant was boiled in and it was very good as a medicine. When drank, the yerba mansa was used for something like a real bad cold. It was also used for sores, infections, to clean up any wounds and that kind of thing” (Zepeda 1985: 67). Betty Melvin also recalled that the “Indian medication” for smallpox is *wiwi’is*, which “they boil and drink” (Bell et al. 1980: 101).

Mearns (1892–93) reported that “the Mexicans at the village of Sonoyta . . . call it ‘Yerba del Manzo’ and assert that it imparts properties to the water which render it deleterious to the teeth. It grows on marshy ground, and emits a strong odor when trodden upon. Mexicans use it medicinally. Found on the boundary line from Lake Palomas [Mimbres Valley, New Mexico] westward to Quitovaquito, in all marshy grounds.” Tom Childs recounted that the Hia C’ed O’odham went to La Salina (Salina Grande, near the Río Colorado Delta) for “yerba mansa” (Van Valkenburgh 1945). Gifford (1931: 24) reported that Kamias ate the seeds, which they pulverized in a cottonwood mortar, and the “meal was then cooked as mush in a pot or baked as bread in hot ashes.”

Lumholtz (1912: 264–265) provided an account of his experience with *Anemopsis* at La Salina, near the Río Colorado delta, in February 1910:

A plant . . . called by the Mexicans herba del manso was a singular growth in these pozos. Its large root, which has a strong medicinal scent, like that which characterizes an apothecary shop, is perhaps the most popular of the many favorite remedies of northern Mexico. It is used internally to cure colds, coughs, or indigestion, as well as externally for wounds or swellings, and is employed in a similar way by the Indians. Of the latter, those who lived in the dune country are said to have been in the habit of chewing bits of this root, as elsewhere tobacco is chewed. These plants grew here in great numbers and to enormous proportions; some of their roots were as much as three feet long and very heavy. The root finds a ready sale everywhere and my Mexicans were not long in gathering as many of the plants as they could carry on their animals. One of the men, whose horse was well-nigh exhausted, walked himself in order to put a load of fifty pounds on his horse.”

OP: Quitobaquito: 7 Feb 1894, *Mearns* 2786 (US); Growing in wet soil along bank of irrigation ditch, 17 Apr 1952, *Parker* 7996; Common in wet soil at springs, 23 Jul 1986, *Felger* 86-209.

LITERATURE CITED

- Bell, F., K.M. Anderson, and Y.G. Stewart. 1980. The Quitobaquito Cemetery and its history. Western Archeological Center, National Parks Service, Tucson, Arizona.
- Crosswhite, F.S. and C.D. Crosswhite. 1984. The southwestern pipevine (*Aristolochia watsonii*) in relation to snakeroot oil, swallowtail butterflies, and ceratopogonid flies. *Desert Plants* 6 (4): 203–207.

- Felger, R.S. 2000. Flora of the Gran Desierto and Río Colorado of northwestern Mexico. Univ. of Arizona Press, Tucson.
- Felger, R.S. 2007. Living resources at the center of the Sonoran Desert: Native American plant and animal utilization. Pp. 147–192 in Felger and B. Broyles (eds.), Dry Borders: Great Natural Reserves of the Sonoran Desert. Univ. of Utah Press, Salt Lake City.
- Felger, R.S. and M.B. Moser. 1985. People of the Desert and Sea: Ethnobotany of the Seri Indians. Univ. of Arizona Press, Tucson.
- Felger, R.S., S. Rutman, J. Malusa, and T.R. Van Devender. 2013a. Ajo Peak to Tinajas Altas: flora of southwestern Arizona: An introduction. *Phytoneuron* 2013-5: 1–40.
- Felger, R.S., S. Rutman, J. Malusa, and T.R. Van Devender. 2013b. Ajo Peak to Tinajas Altas: A flora of southwestern Arizona: Part 2. The checklist. *Phytoneuron* 2013-27: 1–30.
- Felger, R.S., S. Rutman, J. Malusa, and T.R. Van Devender. 2013. Ajo Peak to Tinajas Altas: A flora of southwestern Arizona: Part 3: Ferns, lycopods, and gymnosperms. *Phytoneuron* 2013-37: 1–46.
- Felger, R.S., P.L. Warren, S.A. Anderson, and G.P. Nabhan. 1992. Vascular plants of a desert oasis: flora and ethnobotany of Quitobaquito, Organ Pipe Cactus National Monument, Arizona. *Proceedings of the San Diego Society of Natural History* 8: 1–39.
- Gifford, E.W. 1933. The Cocopah. Univ. of California Publications in American Archaeology and Ethnography 31: 257–334.
- Hrdlicka, A. 1908. Physiological and medical observations among the Indians of the southwestern United States and northern Mexico. Bureau of American Ethnology Bulletin 34: 1–266. Smithsonian Institution, Washington, D.C.
- Lumholtz, C.S. 1912. New Trails in Mexico. Charles Scribner Sons, New York. Reprinted 1971, Rio Grande Press, Glorieta, NM; also 1990, Univ. of Arizona Press, Tucson.
- Mearns, E.A. 1892–1893. Field Books, Mexican Boundary Survey, volume 3. On file, United States National Herbarium, library, Natural History Museum, Smithsonian Institution. Washington, D.C.
- Moreman, D.E. 1998. Native American Ethnobotany. Timber Press, Portland, Oregon.
- Oelschlägel, B., S. Gorb, S. Wanke, and C. Neinhuis. 2009. Structure and biomechanics of trapping flower trichomes and their role in the pollination biology of *Aristolochia* plants (Aristolochiaceae). *New Phytol.* 184: 988–1002.
- Rea, A.M. 1997. At the Desert's Green Edge: An Ethnobotany of the Gila River Pima. Univ. of Arizona Press, Tucson.
- Van Valkenburgh, R. 1945. Tom Childs (interview notes). Ms. on file, Amerind Foundation, Dragoon, Arizona.
- Zepeda, O. 1985. The Sand Papago Oral History Project. Division of Archeology, Western Archeological and Conservation Center. National Park Service, Tucson, Arizona.